

they had been produced by the gradual modification of the earliest form of the series. These are facts of the history of the earth guaranteed by as good evidence as any facts in civil history.

Hitherto I have kept carefully clear of all the hypotheses to which men have at various times endeavoured to fit the facts of palæontology, or by which they have endeavoured to connect as many of these facts as they happened to be acquainted with. I do not think it would be a profitable employment of our time to discuss conceptions which doubtless have had their justification and even their use, but which are now obviously incompatible with the well-ascertained truths of palæontology. At present these truths leave room for only two hypotheses. The first is that, in the course of the history of the earth, innumerable species of animals and plants have come into existence, independently of one another, innumerable times. This, of course, implies either that spontaneous generation on the most astounding scale, and of animals such as horses and elephants, has been going on, as a natural process, through all the time recorded by the fossiliferous rocks; or it necessitates the belief in innumerable acts of creation repeated innumerable times. The other hypothesis is, that the successive species of animals and plants have arisen, the later by the gradual modification of the earlier. This is the hypothesis of evolution; and the palæontological discoveries of the last decade are so completely in accordance with the requirements of this hypothesis that, if it had not existed, the palæontologist would have had to invent it.

I have always had a certain horror of presuming to set a limit upon the possibilities of things. Therefore, I will not venture to say that it is impossible that the multitudinous species of animals and plants may have been produced one separately from the other by spontaneous generation, nor that it is impossible that they should have been independently originated by an endless succession of miraculous creative acts. But I must confess that both these hypotheses strike me as so astoundingly improbable, so devoid of a shred of either scientific or traditional support, that even if there were no other evidence than that of palæontology in its favour, I should feel compelled to adopt the hypothesis of evolution. Happily, the future of palæontology is independent of all hypothetical considerations. Fifty years hence, whoever undertakes to record the progress of palæontology will note the present time as the epoch in which the law of succession of the forms of the higher animals was determined by the observation of palæontological facts. He will point out that, just as Steno and as Cuvier were enabled from their knowledge of the empirical laws of co-existence of the parts of animals to conclude from a part to the whole, so the knowledge of the law of succession of forms empowered their successors to conclude, from one or two terms of such a succession, to the whole series, and thus to divine the existence of forms of life, of which, perhaps, no trace remains, at epochs of inconceivable remoteness in the past.

### NOTES

MOST of the foreign Governments have appointed their delegates to the International Congress of Electricians at Paris. Among the German delegates are M. Wiedemann, editor of *Wiedemann's Annalen*, Helmholtz, Du Bois-Reymond, and Weber, who, as we stated in our last issue, has received a medal in commemoration of the fiftieth anniversary of his professoriate in Halle. The name of Weber is the only one among living men which has been inscribed on the walls of the Palais de l'Industrie. The original instrument which Weber invented with Gauss in 1833 is exhibited in the German section. Amongst the names of English men of science who are said to have been delegated by the English Government are those of Sir William Thomson and Dr. Siemens. One, if not the principal, object of the deliberations of the Congress will be the adoption of a universal system of electric and magnetic measures, as advocated by the British Association. The work of the Commission which has been appointed by it will be discussed, and practical suggestions are to be made relating to it. It is supposed that the electrical and magnetic units are to be considered as a sequel to the metric system of weights and measures. Another question will relate to the laying of submarine cables, viz., the establishment of an international codex of signals for telegraphic steamers,

and the necessity of adopting rules for parallel or transversal lines, liable to endanger the existing ones. But it does not appear that any allusion is to be made to the neutralisation in war time, although it has been recommended by M. Barthélemy St. Hilaire, the Minister of Foreign Affairs. All the sittings are to be private, to the exclusion of the public and Press, except a few lectures given by some members on selected topics. *Procès-verbaux* are to be written and published by a select body of authorised secretaries.

THE telephonic audition of the Opera at the Paris Electrical Exhibition is very popular. Not less than 1500 people are admitted by relays of twenty-four, during two minutes at a time, to enjoy it every opera night. It was contemplated to transmit the performances from the Théâtre Français on the same principle, but it has not been successful. The receipts of the Exhibition exceed 4000*l.* daily.

A SIXTH electrical paper has been started in Paris. It is a large folio issued every Saturday, and called *Moniteur officiel de l'Électricité*. It is conducted by M. Barbieny, a gentleman connected with the political Press, and who has founded several periodicals. Electricity has now more papers in Paris than general science.

THE will of the late Sir Josiah Mason of Birmingham has just been proved. The personal estate was sworn to be of the value of 56,729*l.* The testator had no real property, having in his lifetime disposed of his real estate, worth upwards of 10,000*l.* per annum, either to his orphanage or college trustees, or his great nephew. After legacies and bequests amounting to 7500*l.*, the whole of the testator's personal estate by law applicable to charitable purposes is bequeathed to the trustees of the Mason Science College, for the general purposes of the institution. Elaborate provisions are made for charging the debts, annuities, and legacies on the property which cannot legally be bequeathed to charitable purposes, so as to secure the whole residue for the college.

DR. ARCHIBALD BILLING, M.A., F.R.S., the author of the "First Principles of Medicine," died in London on Friday, at the age of ninety. The deceased physician, who was a native of Ireland, was born in 1791, and was educated at Trinity College, Dublin, and at Oxford, graduating at the first-named University. While engaged at the London Hospital, he instituted the series of chemical lectures which have since become an established feature of the medical school at that institution, but resigned his appointment at the close of 1836, upon the establishment of the University of London. Dr. Billing was a large contributor to the medical Press. He was a member of a large number of learned societies, both in this country and on the Continent.

A CONVENTION of American photographers has recently concluded its sittings at New York. Before separating the members appointed a committee to consider the feasibility of forming an International Photographic Association, and to confer with foreign societies with that view. A report upon the subject will be presented at the next meeting of the Convention, which is to take place at Indianapolis.

THE American Association for the Advancement of Science, at its meeting last month in Cincinnati, took action in reference to the scandal of American degrees, by resolving to unite with the American Philological Association in presenting a memorial to all colleges in the United States empowered to confer degrees, stating the objections to conferring the degree of Ph.D. *honoris causa*, and praying them to discontinue the practice, if it exists. It seems that the reprehensible practice has been growing of late in the United States. There are, it would seem, in the United

States, 360 institutions of a collegiate grade; these colleges and universities receive their charters from the Legislature of their several States, these charters giving them the unlimited right to confer degrees. The president of the college near Cincinnati told one of the speakers, with a face shining with pride, that his college gave seventeen different degrees. One of these was M.P., which in interpretation meant, not Member of Parliament, but Master of Penmanship. It would seem, moreover, that even the degree of S.D. (equivalent, we believe, to our D.Sc.) has actually been granted by some of these American institutions *honoris causa*. We trust that the action of the American Association will have some influence with the peccant colleges; it will, at any rate, put people on their guard against American Ph.D.'s and S.D.'s, as well as D.D.'s.

IN the *Revue Scientifique* of September 3, Mr. G. Delaunay has a paper on the "Equality and Inequality of the Two Sexes," in which he endeavours to show that except in some of the lowest forms of animal life, and in the lowest stages of human society, the inferiority of the female sex to the male is unmistakable in all respects—that physically, mentally, and morally, woman is the inferior of man.

A HUGE mass of rock and earth fell the other day from a mountain side at Somnix in the Grisons, blocked up the course of the Jobel, an affluent of the Rhine, and converted the valley into a lake. The village of Surrheim, hard by, is in great danger.

THE additions to the Zoological Society's Gardens during the past week include two Malbrouck Monkeys (*Cercopithecus cynosurus*) from West Africa, presented by Mr. H. P. Sherlock; a Central American Agouti (*Dasyprocta isthmica*) from Central America, presented by Mr. J. E. Sharp; two Spotted Cayes (*Cologenys paca*) from South America, presented by Dr. Portella; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. James W. Duncan; two Domestic Pigeons (*Columba nas*, var.) from Arabia, presented by Mr. Reginald Zohrab; three Common Chamæleons (*Chamæleon vulgaris*) from North Africa, presented by Mr. Alfred R. Rogers; two Greater Sulphur-crested Cockatoos (*Cacatua galerita*) from Australia, deposited; a Black-headed Caique (*Caica melanocephala*) from Demerara, purchased. The additions to the Insectarium for the past week include *Attacus permyi*, second brood of larvæ hatched; also *Attacus Cynthia*, imago second brood, and the Death's-Head Moth (*Acherontia atropos*) larva, presented by Master Kingchurch; second brood of Ant Lions (*Myrmeleons*), and a brood of the Edible Snail (*Helix pomatia*) from specimens presented by Lord A. Russell, F.Z.S., in April last.

## SOCIETIES AND ACADEMIES

### PARIS

**Academy of Sciences**, August 29.—M. Decaisne in the chair.—M. Faye presented the first volume of his "Cours d'Astronomie de l'École Polytechnique," treating of the diurnal motion, the theory of instruments and errors, organisation of great observatories, mathematics and geodesy. The second volume will be devoted to the solar system.—Dioptric studies, by M. Zenger. He constructs tables which give, in algebraic form, the relation between the radii of curvature and refractive indices of two media forming the objective of a microscope or telescope. Any one may make his own telescope or microscope, without calculation, taking a lens of quartz or crown glass, and a mixture of aromatic substances giving it a dispersion twice as great, or equal for all spectral rays. The lens being corrected, it is combined with one or two other symmetrical lenses, according to the well-known process for getting an aplanetic and achromatic doublet or triplet.—MM. Tresca and Breguet were requested to represent the Academy at the inauguration of the monument to Frederic Sauvage in Boulogne on the 12th inst.—On a very old application of the screw as an organ of propulsion, by M. Govi. This was by Leonardo da Vinci,

about the end of the fifteenth century. In one of his works is a sketch of a device for rising in the air, consisting of a helix formed of wire and cloth to be rotated about a vertical axis. He seems to have made small paper models actuated by thin slips of steel, twisted, then left to themselves. Another sketch shows that Leonardo da Vinci conceived the idea of the parachute.—On some new cases of equipotential figures, realised electro-chemically, by M. Guébbard.—On the absorption of ultra-violet rays by some media, by M. de Chardonnet. Two methods are described. The liquids which circulate in plants or impregnate roots and fruits show a great avidity for chemical rays. Fluorescence does not appear to be in direct ratio to the intensity of actinic absorption; thus, e.g. the decoction of radish is a less powerful absorbent than that of potatoes; yet the former is fluorescent, the latter not. White wine is weakly fluorescent, red wine lacks the property. The few animal substances studied gave very varied results. While blood, even very dilute, is a strong absorbent, the (fresh) aqueous humour of a calf's eye and the albumen of hen's eggs have no action on the chemical rays (at least up to 20 mm. thickness). Distilled water, alcohol, sulphuric ether, normal collodion, and solution of cane-sugar are also without action. Gelatine appropriates readily all the actinic rays. An object-glass of Dallmeyer projected an invisible spectrum 25 to 40 per cent. longer than one of Darlot, of Paris, of equal focus.—Figures produced by fall of a drop of water holding minium in suspension, by M. Decharme. Minium, in fine powder, is mixed with water and spread uniformly on a horizontal glass plate; then a drop of the mixture is let fall on this layer. Figures resembling those of the three systems Caladni observed on vibrating plates are produced; the three types usually coexist, but one or other may be made to predominate at will.—On the composition of buckwheat, by M. Lechartier. Marked differences appear between the crops of 1879 and of 1880. Thus the ashes of the straw in 1880 had twice as much potash as in 1879, and phosphoric acid was still more increased; and there was also more chlorine. The composition of the grain is little modified. The straw may contain more of mineral matter than the grain. Buckwheat removes more of the fertilising principles from the soil than corn.—On hydrosulphurous acid; reply to M. Schutzenberger's note, by M. Bernthsen.—On the dissolution of silver in presence of alkaline iodides, by M. Ditte.—On the constitution of glyceric ether, and on the transformation of epichlorhydrine into normal propylic alcohol, by M. Silva.—On pyruvic alcohol and its derivatives, by M. Henry.—Action of triethylamine on epichlorhydrine; compounds of oxallyltriethylammonium, by M. Reboul.—Biological evolution of the puccons of the alder tree, by M. Lichtenstein.—Observations on a new enunciation of the second law of Gay-Lussac concerning combinations of gas, by M. Garcia de la Cruz. He indicates some of the numerous exceptions to M. Verschaffel's proposition: "The space occupied by a gaseous compound is always double the space occupied by that one of the components which enters with less volume into the combination." This law he regards as less general than the laws of contraction long accepted.

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